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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/374,502	08/13/1999	QING MA	42390.P6623	3832

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EXAMINER

FENTY, JESSE A

ART UNIT

PAPER NUMBER

2815

DATE MAILED: 05/28/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 09/374,502	Applicant(s) MA ET AL.	
	Examiner Jesse A. Fenty	Art Unit 2815	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 19 February 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-24 and 31 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3, 5, 6, 8, 9, 11, 14-16, 19-22 and 31 is/are rejected.
- 7) ☒ Claim(s) 4, 7, 10, 12, 13, 17, 18, 23 and 24 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

### Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All   b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                  | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____  |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)         | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other:  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1, 2 and 31 are rejected under 35 U.S.C. 102(b) as being anticipated by Aoki et al. (U.S. Patent No. 5,923,073).

In re claims 1 and 31, Aoki (Figs. 3a-7b) discloses a semiconductor device, comprising:

An active area formed in a semiconductor substrate; and

An isolation structure comprising at least one dielectric material (18) disposed within a trench which extends into said semiconductor substrate, wherein said isolation structure substantially surrounds said active area, and wherein at least a portion of said isolation structure is adapted to modify stresses (column 1, lines 40-50) incurred on said active area.

In re claim 2, Aoki discloses the device of claim 1, wherein said active area further comprises nMOS device components including an n-type source and drain (40) and a gate structure (38).

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3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 3, 5, 6 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aoki as applied to claims 2 and 8, and further in view of Cleeves (U.S. Patent No. 6,091,129).

In re claims 3, 6 and 9, Aoki discloses the device of claims 2, 5 and 8, but does not expressly disclose the trench isolation layer comprising a low-modulus film. Cleeves discloses a low-modulus soft glass layer (60) as filler for a trench isolation region. It would have been obvious for one skilled in the art at the time of the invention to use the soft glass layer as disclosed by Cleeves for the trench fill of Aoki for the purpose, for example, of not only decreasing thermal stress, but limiting mechanical stress of the semiconductor device (Cleeves; column 4, lines 22-35).

In re claim 5, Aoki discloses the device of claim 2, but does not expressly disclose the dimensions. It would have been obvious to one having ordinary skill in the art at the time the invention was made to determine the optimum working value of the trench, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F. 2c 272, 205 USPQ 215 (CCPA 1980).

5. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Aoki (as above) in. In re claim 8, Aoki discloses the device of claim 1, but does not expressly disclose the transistor being p-type. The reversal of material conductivity and potential is obvious to one of ordinary

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skill in this art since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use. *In re Leshin*, 125 USPQ 416. Therefore, though the device is devised as n-type, those skilled in the art will recognize that the spirit of the invention is not compromised if the material conductivity is reversed and can be interpreted as p-type.

In re claim 11 and 14, Aoki in view of Cleeves discloses the device of claim 8, but does not expressly disclose the trench isolation layer comprising a low-modulus film. Cleeves discloses a low-modulus soft glass layer (60) as filler for a trench isolation region. It would have been obvious for one skilled in the art at the time of the invention to use the soft glass layer as disclosed by Cleeves for the trench fill of Aoki for the purpose, for example, of not only decreasing thermal stress, but limiting mechanical stress of the semiconductor device (Cleeves; column 4, lines 22-35).

In re claims 15 and 20, Aoki discloses the device of claim 8, but does not expressly disclose the dimensions. It would have been obvious to one having ordinary skill in the art at the time the invention was made to determine the optimum working value of the trench, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F. 2c 272, 205 USPQ 215 (CCPA 1980).

In re claims 16 and 21, Aoki discloses the device of claims 15 and 20 respectively, wherein said isolation structure comprises a low-modulus, dielectric material disposed within said at least a portion of said trench parallel to the channel current direction.

In re claims 19 and 22, Aoki discloses the device of claims 15 and 20 respectively, wherein said isolation structure comprises a compressive stress-inducing, dielectric material

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disposed within said at least a portion of said trench perpendicular to the channel current direction of the pMOS components.

***Allowable Subject Matter***

6. Claims 4, 7, 10, 12, 13, 17, 18, 23 and 24 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

7. The following is a statement of reasons for the indication of allowable subject matter:  
The semiconductor device including at least isolation structures comprising a high modulus dielectric material and a tensile stress-inducing, dielectric material is neither anticipated nor obvious over the prior art of record.

*Response to Appeal Brief*

In view of the Appeal Brief filed 02/19/03, PROSECUTION IS NOW REOPENED. A new ground of rejection is set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or;

(2) request reinstatement of the appeal.

If reinstatement of the appeal is requested, such request must be accompanied by a supplemental appeal brief, but no new amendments, affidavits (37 CFR 1.130, 1.131 or 1.132) or other evidence are permitted. See 37 CFR 1.193(b)(2).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jesse A. Fenty whose telephone number is 703-308-8137. The examiner can normally be reached on 5/4-9 1st Fri. Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on 703-308-1690. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-746-3892 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

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Jesse A. Fenty  
Examiner  
Art Unit 2815

JAF  
May 19, 2003



**EDDIE LEE**  
SUPERVISORY PATENT EXAMINER  
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